Radiological and Chemical Contaminants Entering the Near-Shore Environment of the Columbia River at the Hanford Site's 300 Area

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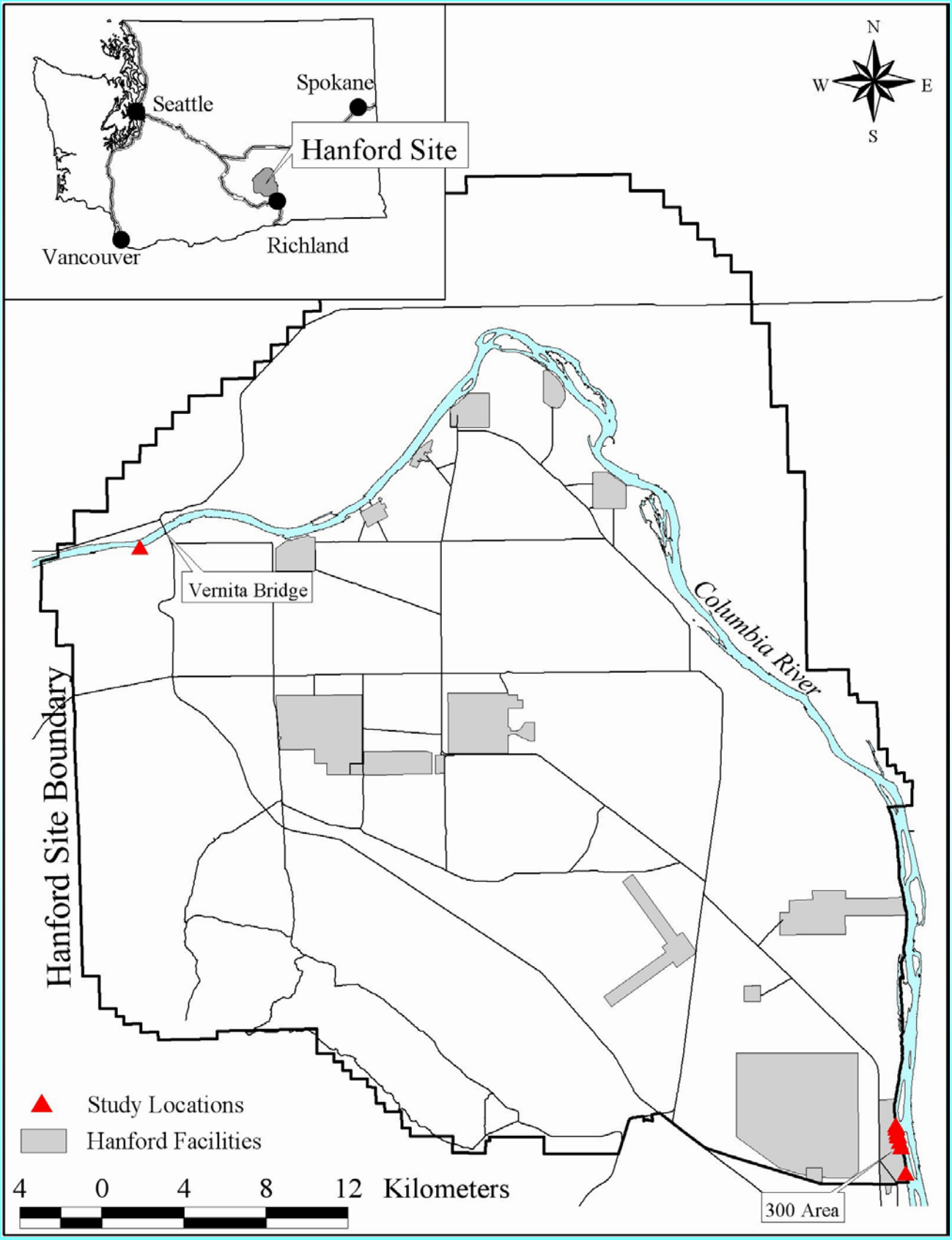
Objectives

- Characterize the radiological and chemical conditions existing in the near shore of the 300 Area during a time when the effect of groundwater seepage is likely to be maximized.

- Assess the potential impact on resident ecological receptors and people that may visit this location.

- Support clean-up efforts



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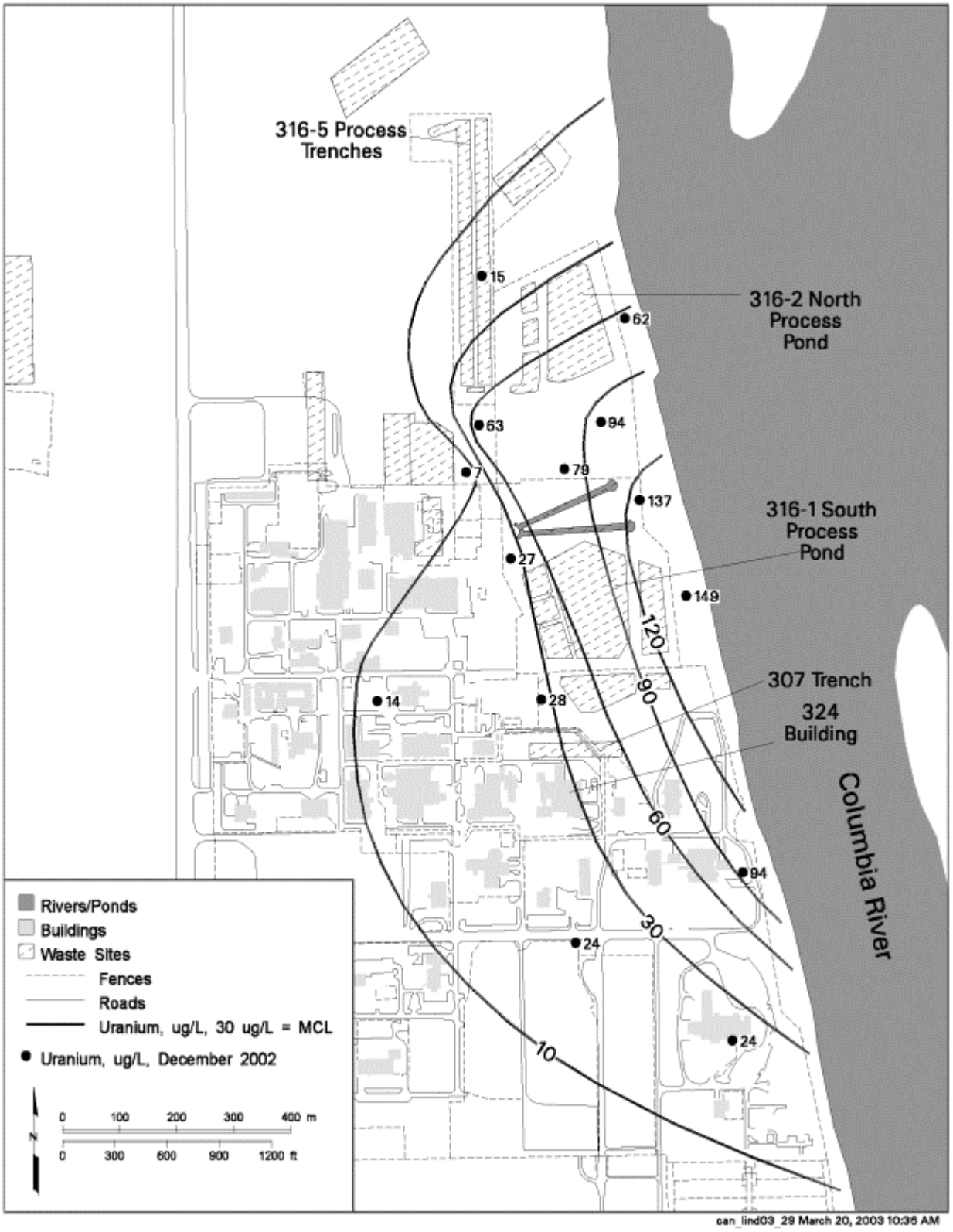
Contaminants of Concern

- Primary radiological – isotopic uranium and tritium
- Secondary radiological – strontium-90, and technetium-99, gamma emitters
- Non-radiological – volatile organics and metals (including uranium)

300 Area Looking South to Richland

300 Area Uranium, December 2002



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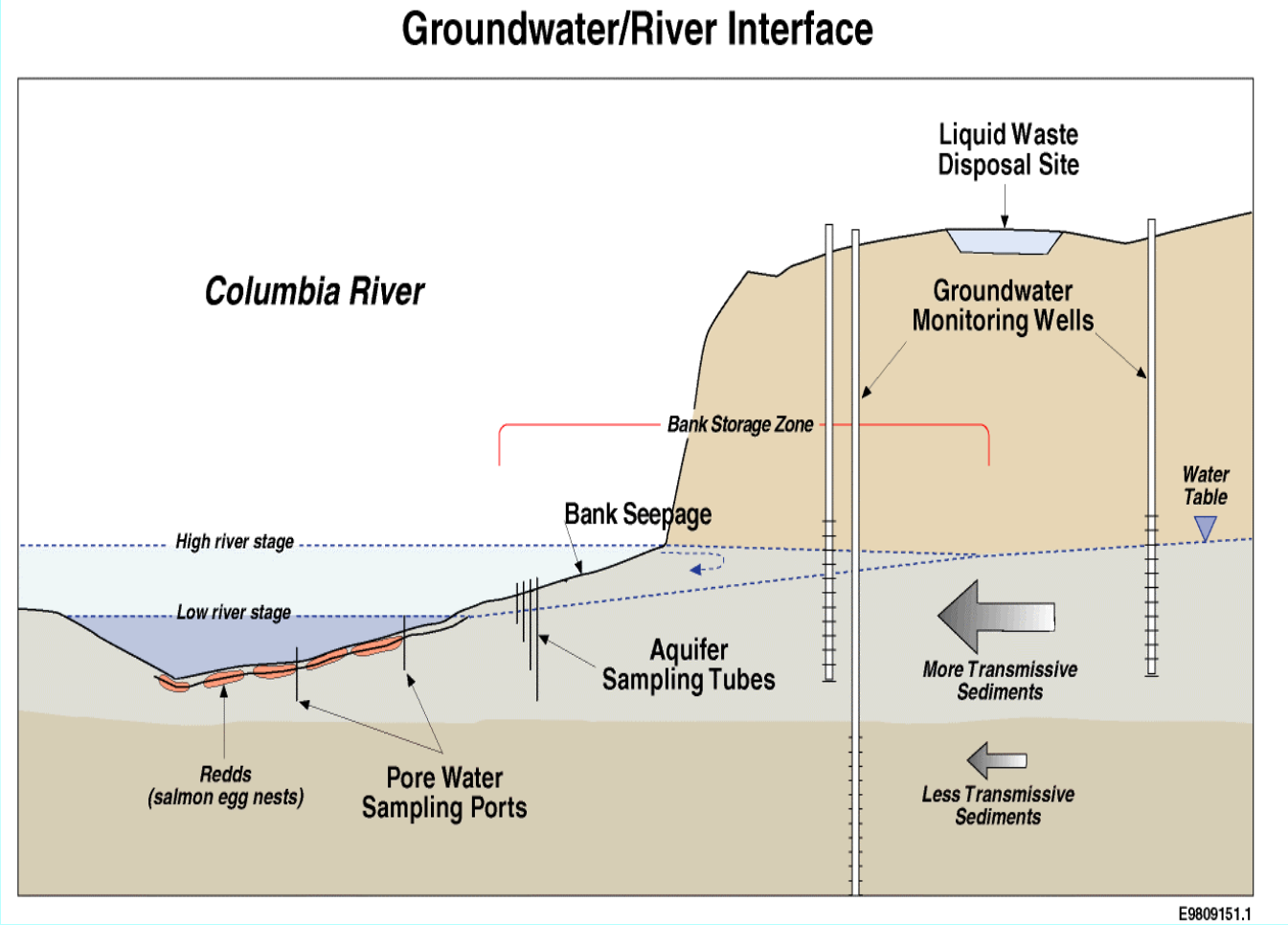
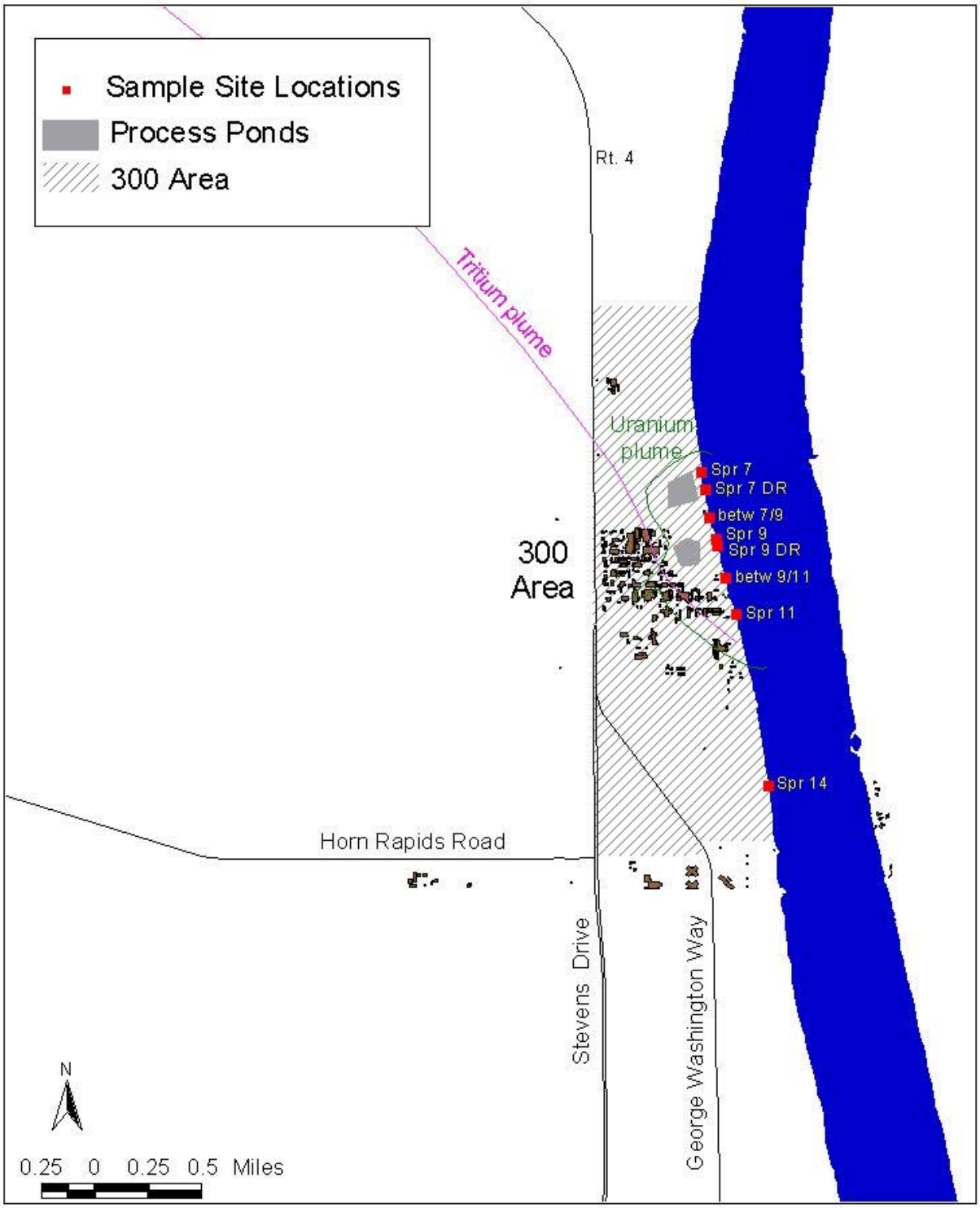
Groundwater/River Interface



300 Area Riverbank Spring #7
(70K cfs, low McNary pool)

300 Area Shoreline Sample Site Locations



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Sampling Media

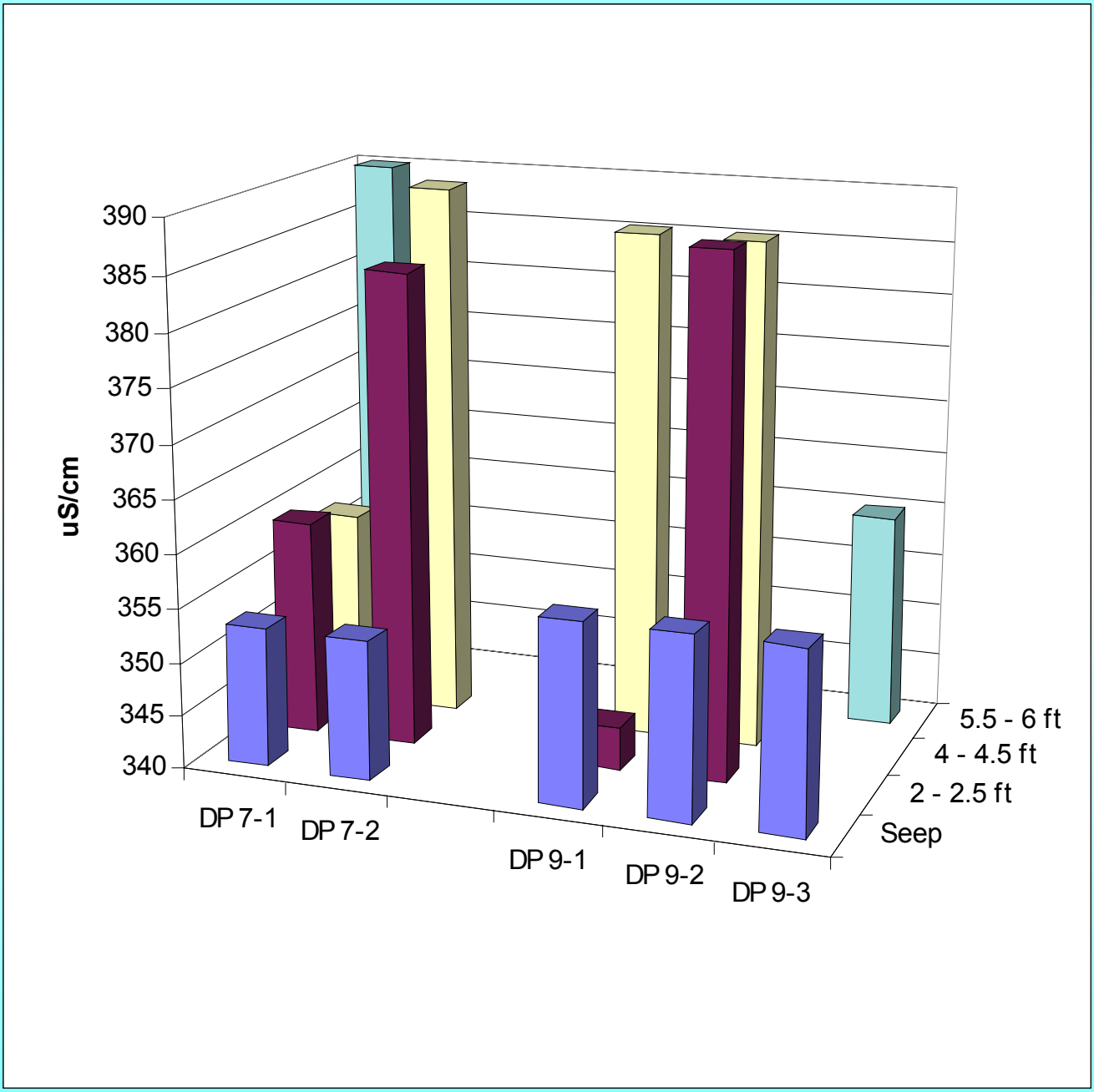
- Riverbank spring water
- Near-shore groundwater
- Near-shore surface water
- Sediment
- External radiation
- Upland biota (caddis fly, darkling beetle, mice, riparian plants)
- Aquatic biota (caddis fly, clams, sculpin, crayfish, milfoil, periphyton
- Aquatic biomonitoring (clams, sculpin)

Water samples

- Sample springs (#7 and # 9, others not flowing)
- Nearshore river water, collected 6 cm off river bottom at 4 depths (0.25, 0.5, 1.0 and 1.5 meters), distance from shoreline based on grade
- Cross-river transects
- Drive points (shallow groundwater)

300 Area Riverbank Spring #7
(Looking North, 70K cfs, low McNary Pool)

Conductivity in 300 Area Drive Point Water Samples and Springs



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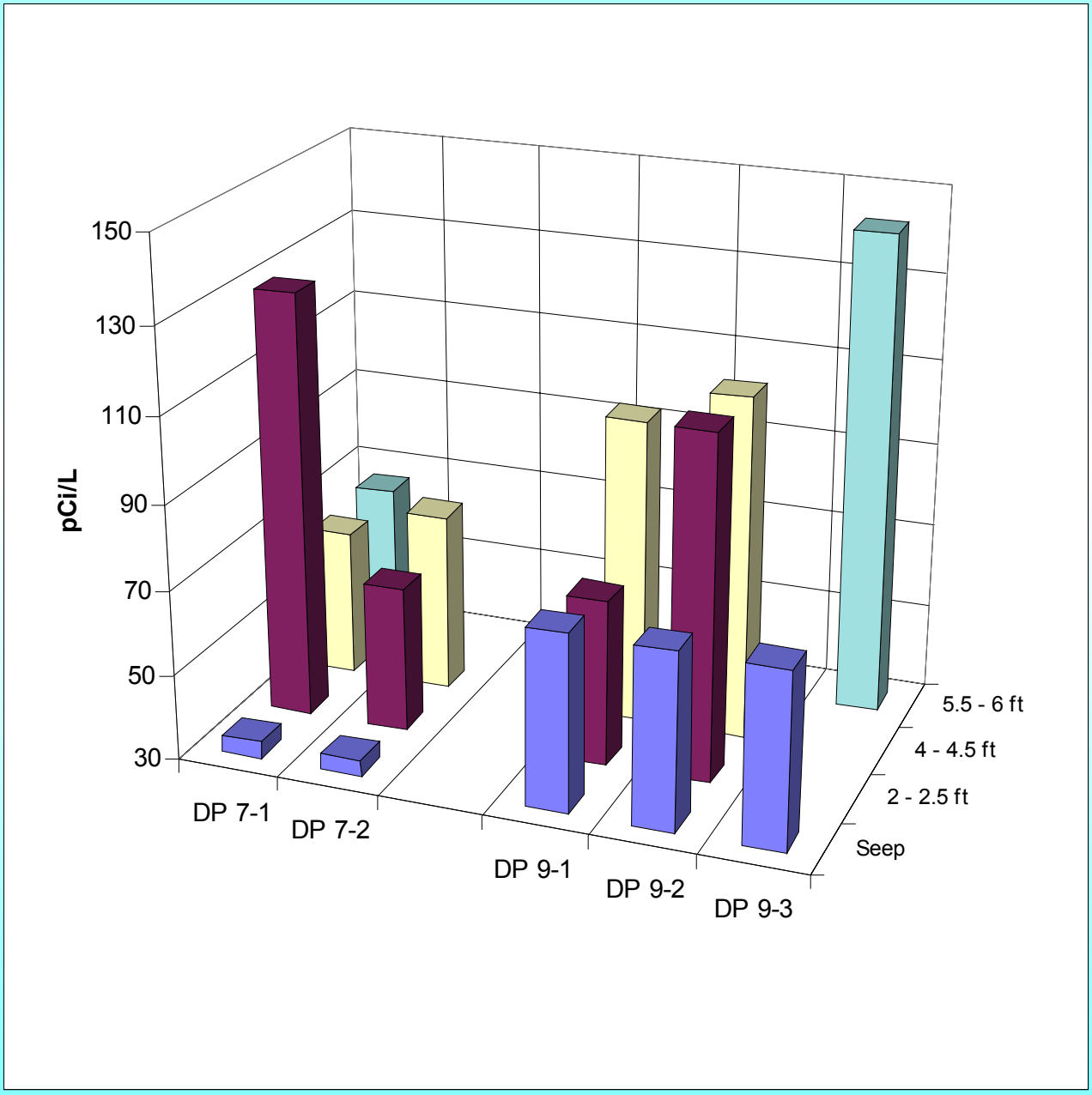
Total Uranium in 300 Area Drive Point Water Samples and Springs



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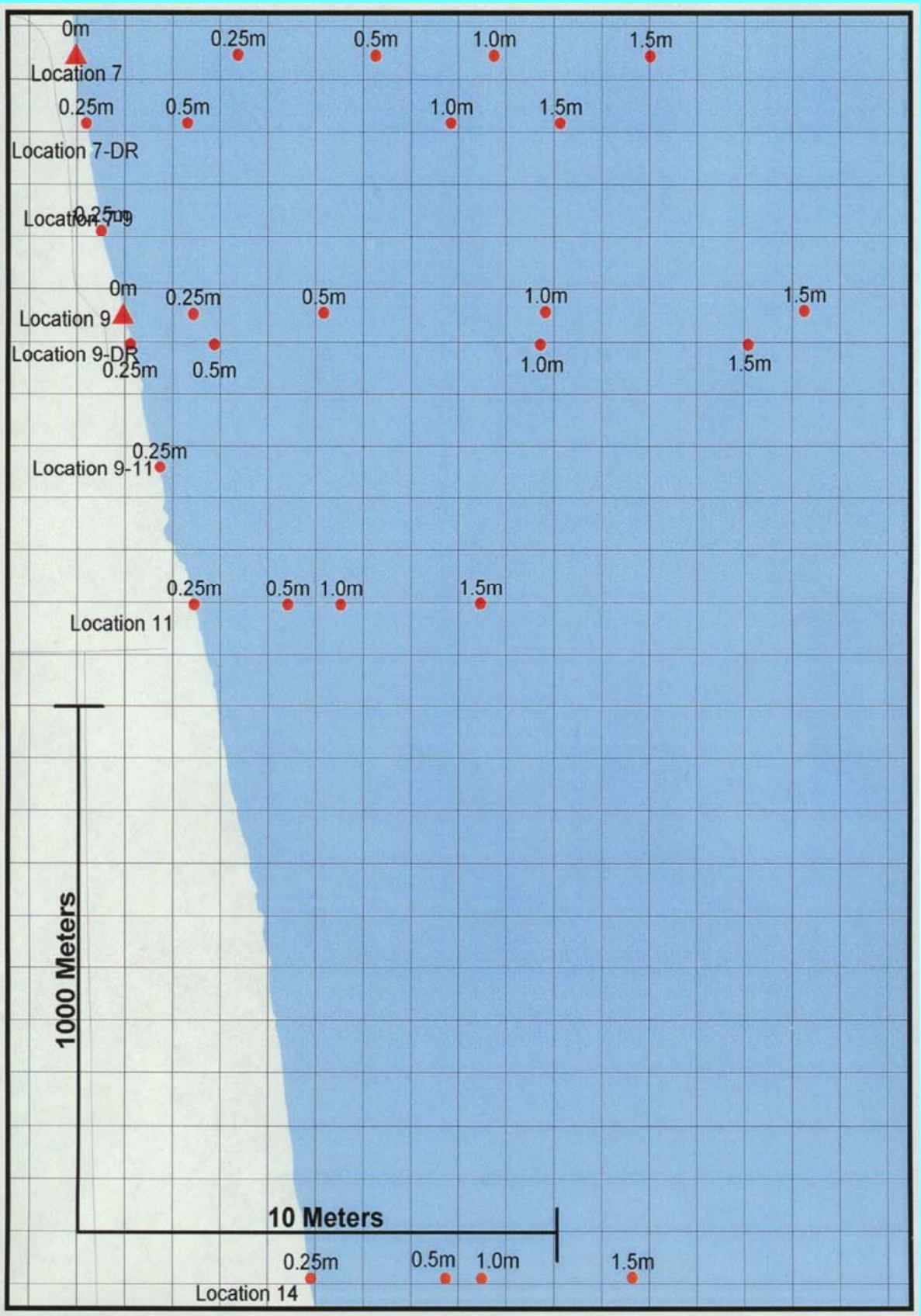

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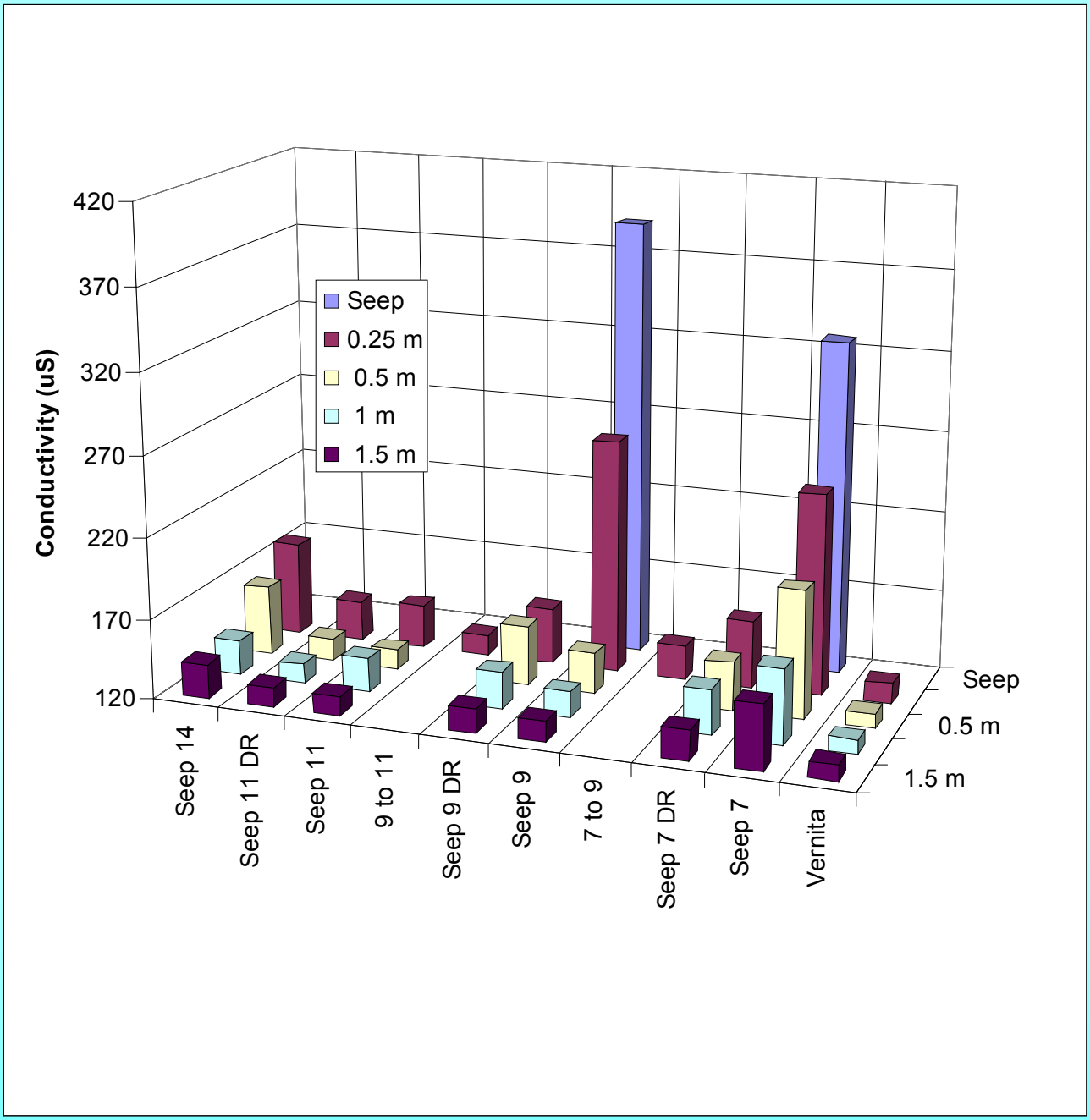
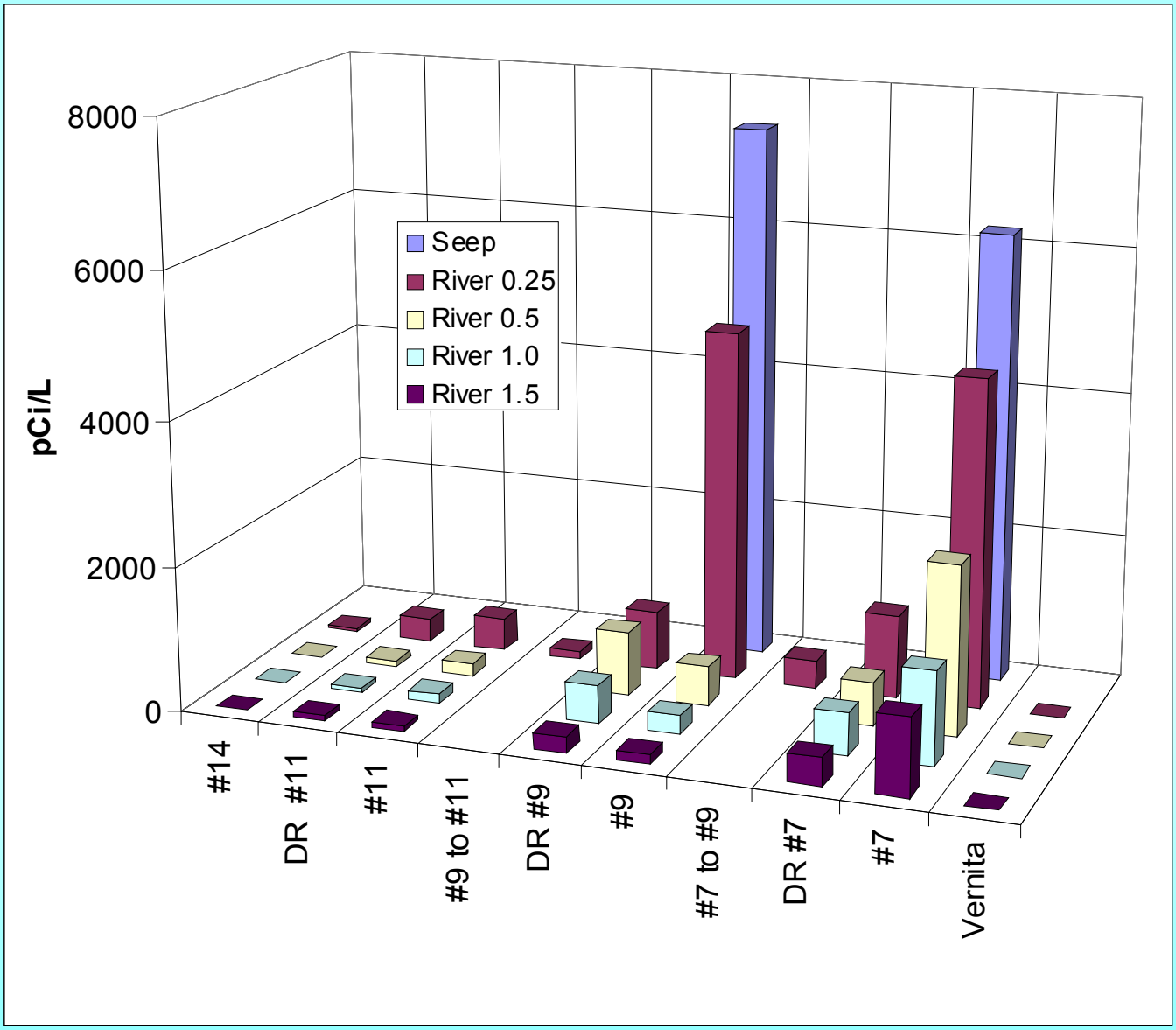
300 Area Near-Shore Conductivity



300 Area Near-Shore Tritium



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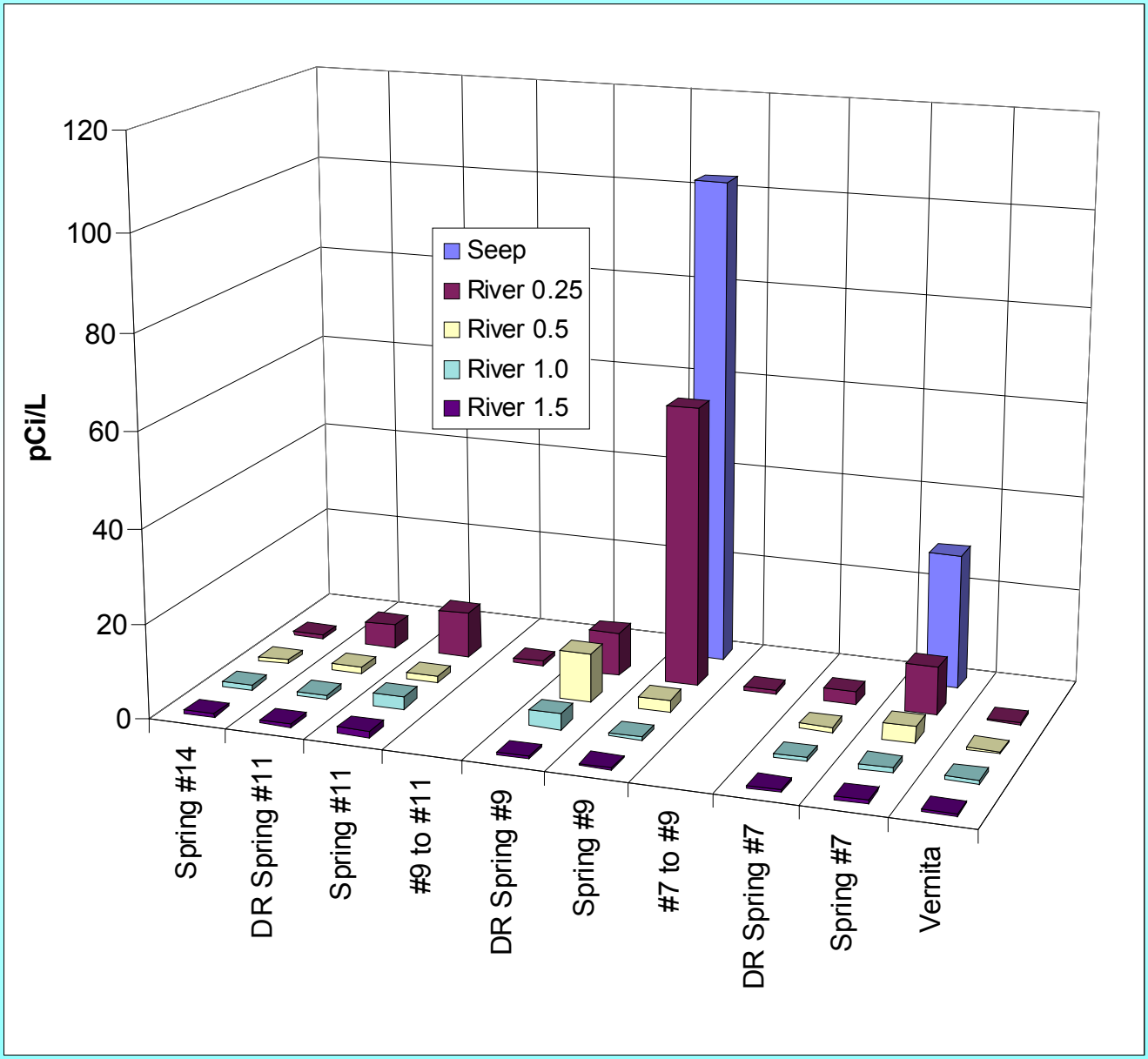
300 Area Near-shore Total Uranium



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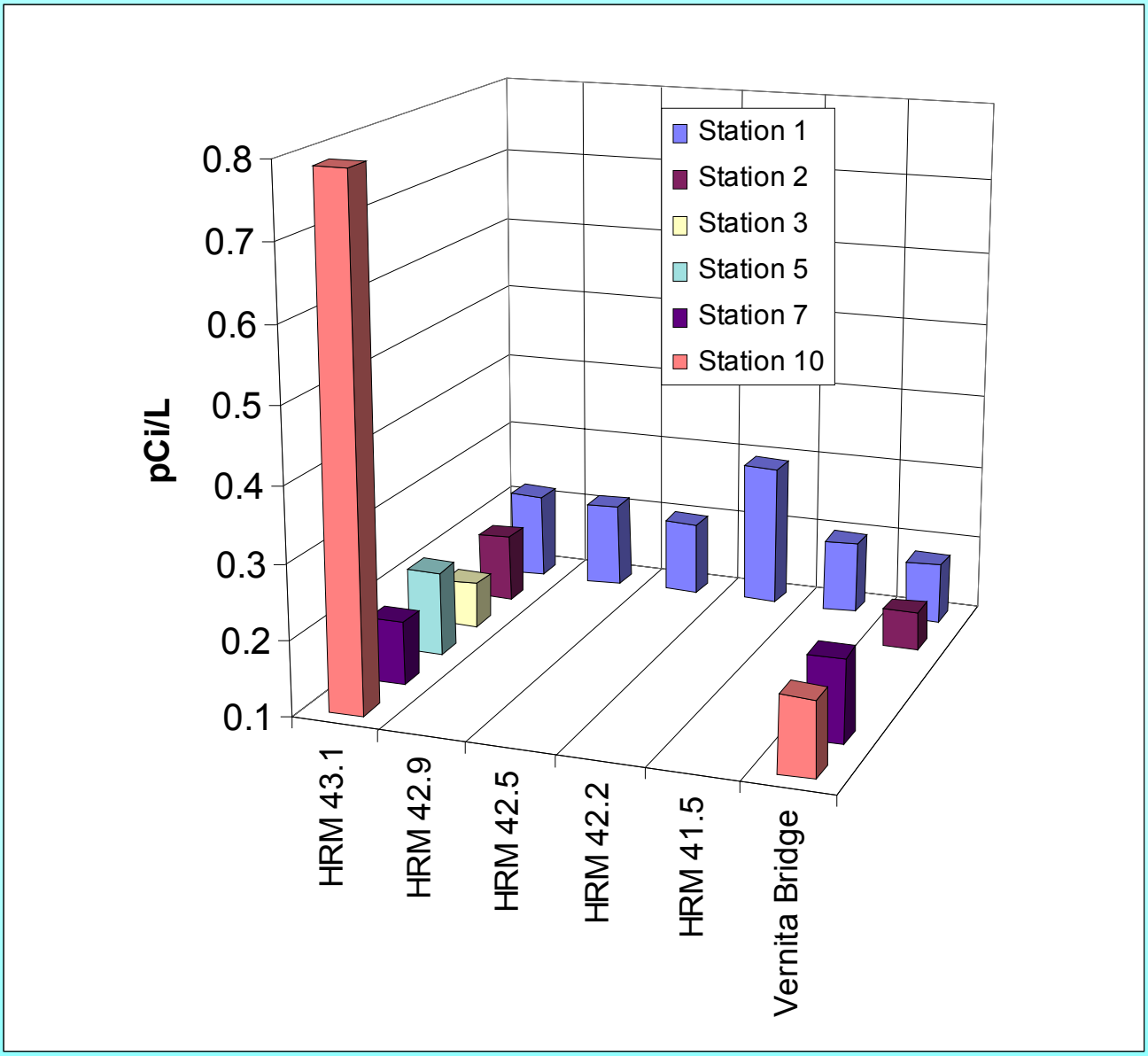
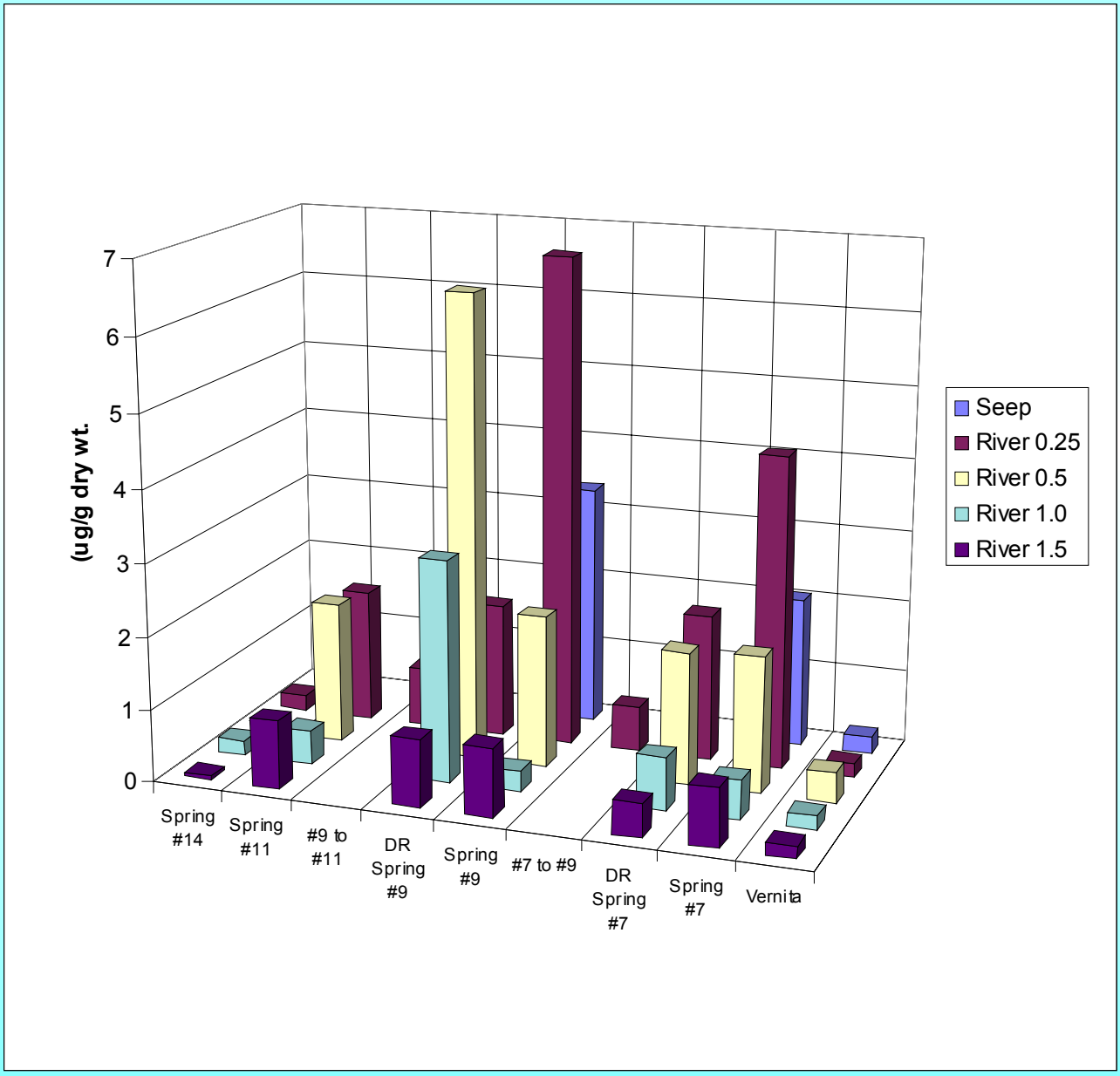
Total Uranium in Cross River Transects and Near-Shore Samples



Uranium in Soft Tissues of Asian Clams (300 Area Near-Shore)



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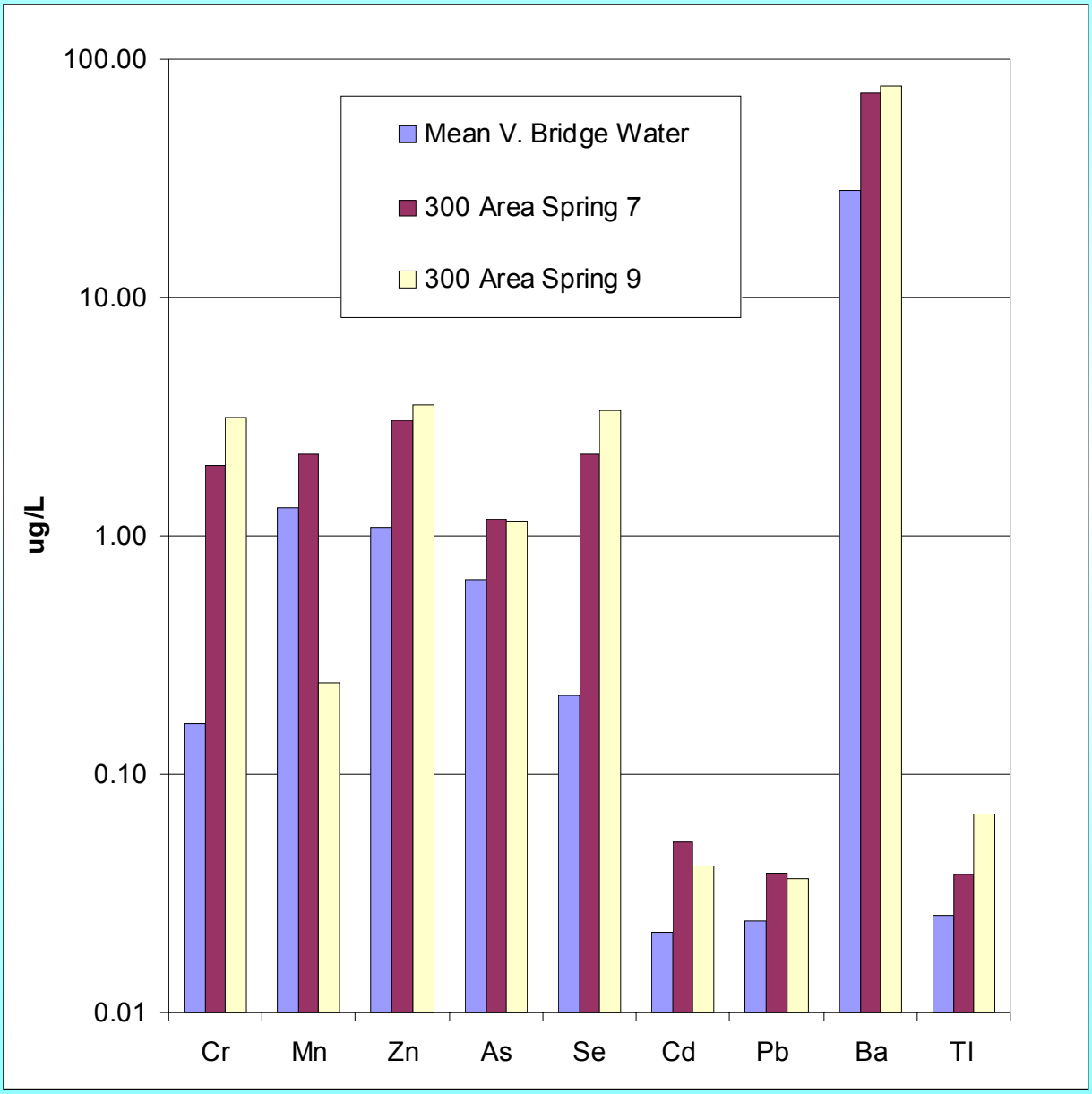
Conclusions

- Progression of uranium observed from groundwater=> spring => river => biota
- Only gross alpha and U exceeded ambient surface water quality criteria for 300 Area water samples
- 300 Area water was elevated compared to background for Cs-137, Cr, I-129, Tc-99, tritium, and some metals
- 300 Area sediment was elevated compared to background for Sr-90, Cs-137, and uranium (metals were similar to background)
- Some 300 Area riparian biota were elevated compared to background for Tc-99, tritium, and U

Conclusions (cont.)

- Some 300 Area aquatic biota elevated for Tc-99, U, and metals
- Clam samples provided information on the spatial extent of groundwater contaminants
- Similar spatial distributions for contaminants in clams and river water
- Individual-level health of biota was similar at 300 Area and background
- External radiation measures were similar to background

Filtered Metals in Riverbank Spring Water (300 Area Near-Shore)



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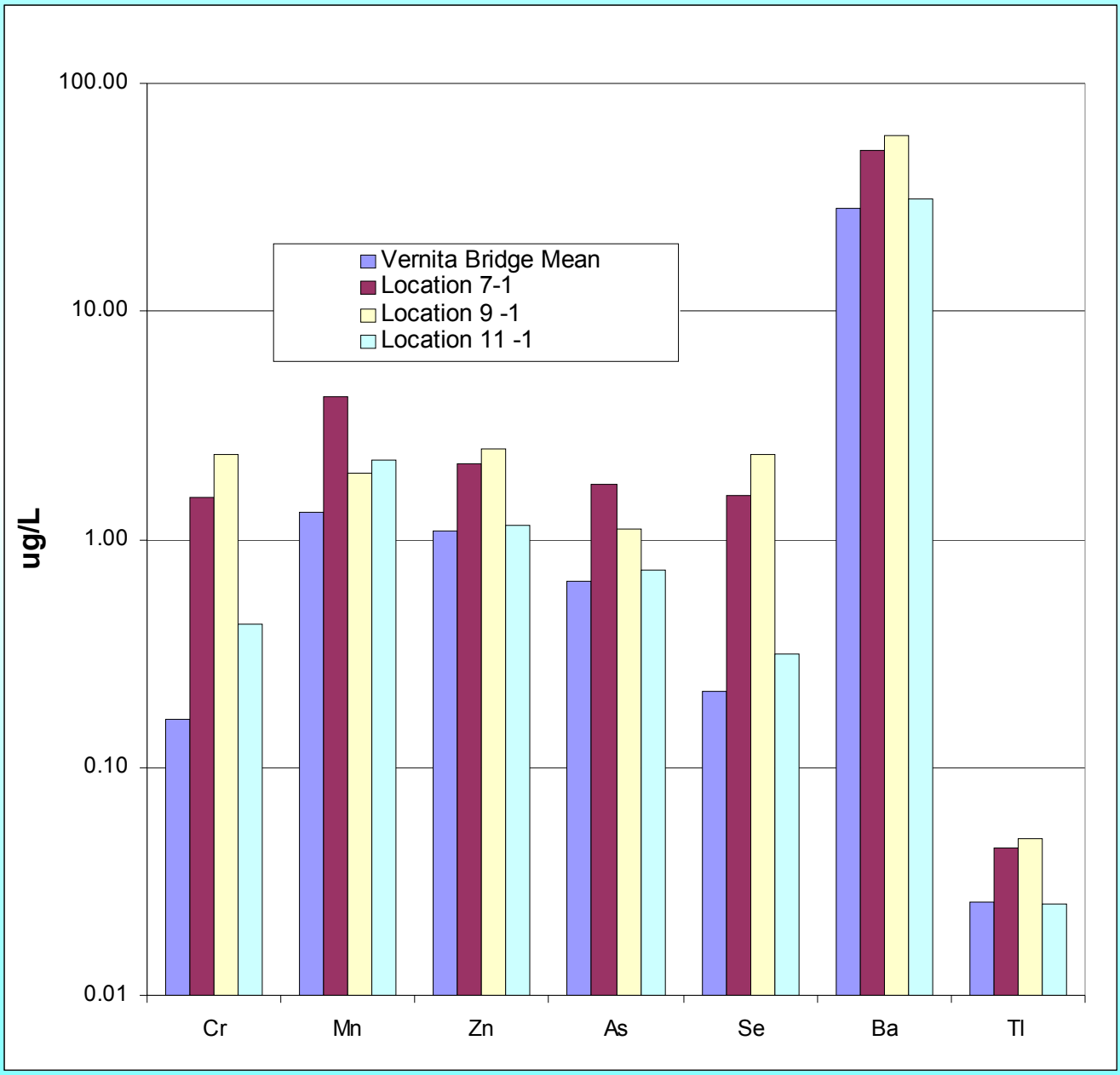
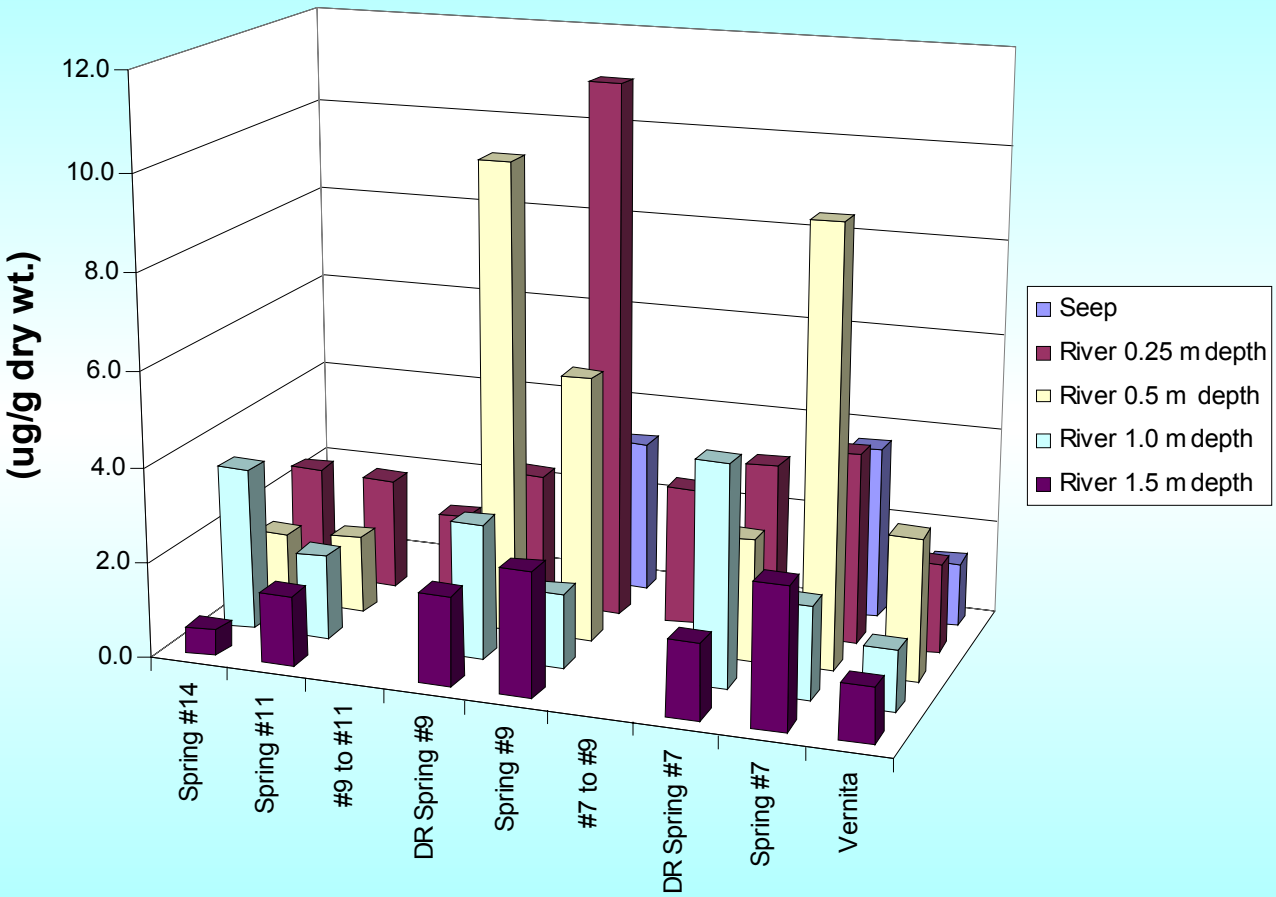
Filtered Metals in Near-Shore Water (300 Area and Vernita Bridge)



Chromium in Soft Tissues of Asian Clams (300 Area Near-Shore)



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